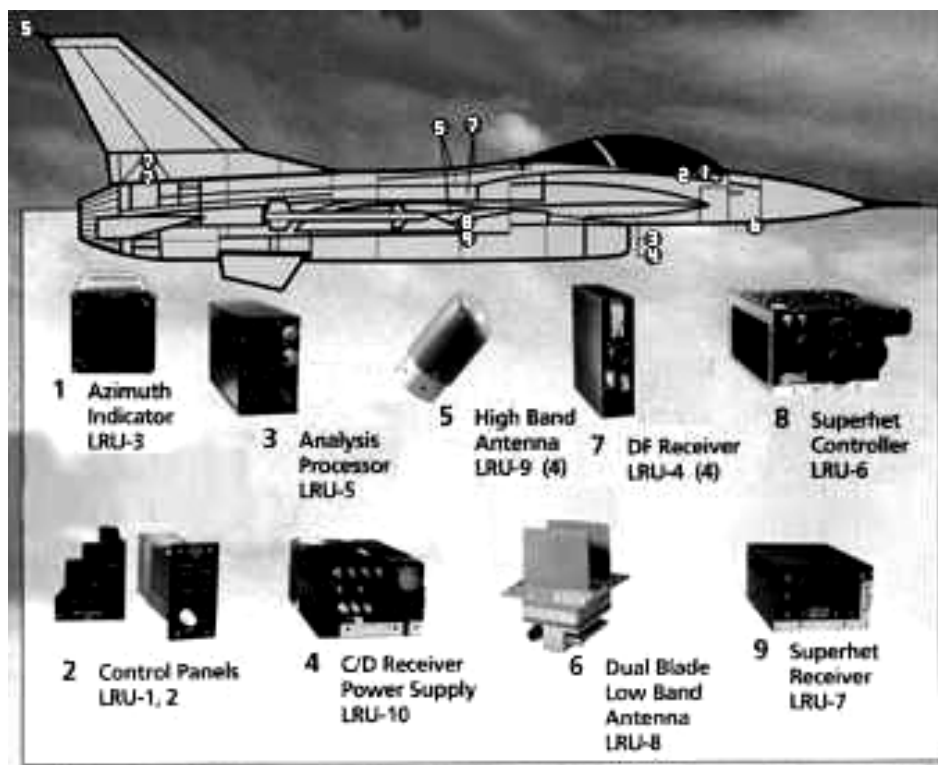


RADAR WARNING RECEIVER (RWR) AN/ALR-56M



Air Force ACAT III Program

Total Number of Systems: 533
Full-rate production: 2QFY93

Prime Contractor

Lockheed Martin Fairchild Systems

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2010

The AN/ALR-56M Radar Warning Receiver (RWR) contributes to the *Joint Vision 2010* concept of **full-dimensional protection** by improving individual aircraft probability of survival through improved aircrew situational awareness of the radar guided threat environment. The ALR-56M includes a fast scanning superhet receiver, superhet controller, analysis processor, low band receiver/power supply, and four quadrant receivers. It provides inputs to the ALE-47 CMDS (Countermeasure Dispenser System) to enable the selection and dispensing of chaff and/or flares for aircraft self-protection. The ALR-56M is designed to provide improved performance in a dense signal environment and improve detection of modern threat signals compared to the version of the ALR-69 that it replaced. A miniaturized version of the F-15's ALR-56C, the ALR-56M is a form and fit replacement for the ALR-69 RWR in the F-16 Block 40 and other aircraft. ALR-69 upgrades are underway for earlier blocks of F-16 and other aircraft. The ALR-56M is the RWR chosen for integration into the open architecture Defensive System Upgrade Program in the B-1B bomber Conventional Mission Upgrade Program. The ALR-56M upgrades are developed in conjunction with upgrades to the ALE-47.

BACKGROUND INFORMATION

A December 1992 DOT&E B-LRIP report stated that AN/ALR-56M was effective and suitable. In addition, the 1992 DOT&E B-LRIP report recommended FOT&E “because of the deferral of tactics verification testing and the concern about bearing errors and delayed deletions during extensive maneuvers. The current TEMP calls for additional ALR-56M testing as part of continuing Block 40 and Block 50 F-16 follow-on testing.

The National Defense Authorization Act for the Fiscal Year 1989 Conference Report directed that “all future operational results for RWR update programs be reviewed and approved by the Director of Operational Test And Evaluation, prior to obligation of production funds.” AN/ALR-56M is such a program.

FOT&E has been conducted by the U.S. Air Force Air Combat Command (ACC), Air Warfare Center on subsequent software versions. ACC has continued routine upgrades to Mission Data Table software to keep pace with changing electronic order of battle priorities for various geographical areas of operation. However, tactics verification testing during FOT&E resulted in notations in the ALR-56M User’s Handbook concerning the operational significance of the performance problems considered to be training issues. Training is required to ensure that aircrews understand ALR-56M performance during maneuvering.

Operationally Significant Changes to the ALR-56M. Some of the major operationally significant changes associated with the latest software upgrade, Operational Flight Program (OFP) 0040 include the following:

- **SADS (Simulated Air Defense System) X Processing.** This change reduces ambiguities between the SADS X TTR (target tracking radar) and AI (airborne interceptor) radars.
- **Burst Enhancements.** This change reduces the number of multiple threat symbols associated with burst-ranging radars.
- **Missile Launch Audio Recycle.** Missile launch audio warning will now repeat instead of being a one-time initial warning.
- **Excess Maneuvering Fast Ageout and Redisplay.** During excess maneuvers, threat symbols will age out as soon as a break-lock occurs and will redisplay as soon as a new lock-on occurs.

The ALE-47 CMDS (Countermeasure Dispenser System) operational flight program (OFP) 9023 is concurrently being upgraded along with the ALR-56M OFP 0040 block changes. The ALE-47 CMDS is a software-controlled system designed to counter target tracking radars, radio frequency and infrared missile seekers using chaff and flares. ALE-47 can dispense countermeasures using any of six preprogrammed manual programs. It can also use threat information from ALR-56M and aircraft altitude information from aircraft avionics to calculate optimal dispense programs for a given threat type, range, and azimuth. In AUTO mode, ALE-47 will automatically dispense calculated programs without pilot command. In semiautomatic, ALE-47 will dispense a calculated program only when the pilot commands activation.

Operationally Significant Changes to the ALE-47.

- **Track File Ambiguity Message.** When the RWR determines a threat signal is ambiguous with one or more other threat signals, the OFP 9023, provides the capability for ALE-47 to consider the three highest priority ambiguities when calculating a dispense program.
- **Squib Failure Tracking.** Expendables that either fail to poll or misfire will be identified and discarded.
- **System Checkout.** This update provides the capability to complete a ground check of the ALE-47 system without having to load special mission data.

TEST & EVALUATION ACTIVITY

Fiscal Year 1999 test activity involved ALR-56M weapon system sustainment block cycle/operational flight program changes. Desired changes to fielded OFP are a culmination of user requirements consolidated and prioritized by Headquarters, Air Combat Command, Air Force. Some of these requirements include deficiencies noted in previous testing, desired enhancements targeted at handling evolving threats, as well as man-machine interface improvements directed at improving pilot situational awareness. A broad summary of those software changes include: (1) update of Mission Data threat parameters; (2) improved threat information interface with the ALE-47 expendable countermeasure dispensing system (OFP 9023); and (3) improved detection of emitters with complex waveforms. The latest version of the ALR-56M OFP to be tested, Software Version 0040, will include upgraded computer hardware and re-hosting of the execution software language to ADA. Initial contractor developmental testing commenced in early 2QFY98, prior to the system undergoing government Electromagnetic Interference and Compatibility Testing at Edwards AFB, CA. The system has also been subjected to extensive integration testing at both the Integrated Defensive Avionics Lab at Wright-Paterson AFB in Dayton, OH and the Integrated Avionics Test Facility at Tyndall AFB. Pre-flight Integration of Munitions and Electronic Systems testing was completed at Eglin AFB. ALR-56M 0040 OFP Developmental Flight Testing occurred at the 416th Flight Test Squadron at Edwards AFB, CA, where over 20 plus developmental flight test were conducted encompassing a variety of Air-to-Air and Air-to-Ground mission profiles. DOT&E approved the ALR-56M Operational Test Plan on October 15, 1999. The system was transitioned over to the 36th Electronic Warfare Squadron at Eglin AFB, FL, where it completed Phase I Operational Testing (Familiarization & Training). Phase II Operational Testing (Dedicated Flight Testing) is underway and will continue throughout FY00, with an anticipated completion date in 4QFY00. Operational Test results will be briefed to DOT&E upon completion of testing and analysis of final data.

TEST & EVALUATION ASSESSMENT

The ALR-56M test and evaluation program is progressing well toward completing FOT&E of OFP Software Version 0040 in FY00. The test team has done a good job of focusing extensive effort in early system integration and Hardware-in-the-Loop testing. This early and integrated type of testing reduces risk early in the program and has provided for better confidence as the system progresses toward actual operational testing. DOT&E has worked closely with the test team to fully understand the structure of test planning, constraints, limitations, and strategy for optimizing effective test results. This approach allows the team to resolve issues as they occur, developing informed solutions with a clear

understanding of the goals and objectives. The operational test team's approach toward testing and the strategy implemented toward the resolution of identified deficiencies/anomalies noted during testing should adequately assess the system's operational effectiveness and suitability.